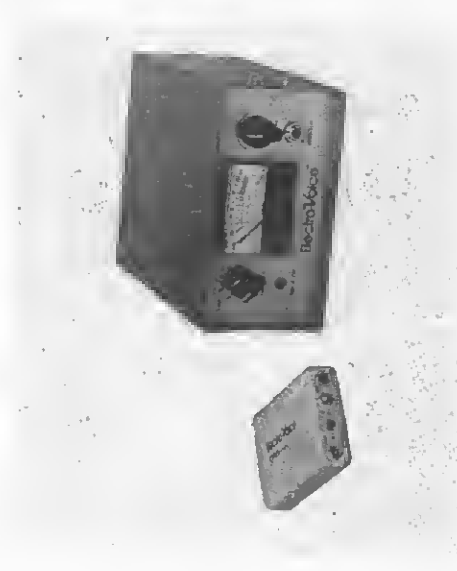


# Model 221/121

## Wireless Microphone System

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PRELIMINARY OWNER'S MANUAL



### OPERATION OF THE 221 TRANSMITTER

1. Place the transmitter power switch in the off position.
2. Open the transmitter case by turning the slotted screw case latch counterclockwise (a dime or penny will fit the slot).
3. Insert a fresh 9-volt Alkaline battery, Mallory MN1604 or equivalent.
4. Connect the antenna to the transmitter by pushing the antenna connector into the transmitter until it clicks.
5. Connect a microphone to the microphone input. See Page 5 for more detailed information on the microphone input.
6. With the microphone placed on the talent, have the talent run through the dialogue. While observing the "Peak Mod Indicator" (an LED) located on the printed circuit board directly behind the transmitter's case latch, adjust the "GAIN" control so that the LED flashes briefly only during the loudest passages in the dialogue.
7. Close the transmitter cover and engage the case latch screw by turning it clockwise.
8. Place the transmitter on the talent and dress the antenna so that it will remain in a vertical position.

### OPERATION OF THE 121 RECEIVER

1. Connect the supplied AC power cord to the receiver at the socket labeled AC IN. Connect the other end of the power cord to an AC outlet supplying 105 to 125 volts AC, 50 to 60 Hz.
2. Connect the supplied whip antenna to the socket located on the rear panel of the receiver labeled antenna so that it is in a vertical position.
3. Place the "Line Mic" switch in the proper position for the desired output level.
4. Connect the audio output of the receiver to your equipment by using the "Audio Out" connector on the rear panel of the receiver.
5. Turn the "PWR/MTR" switch to the VU position. The panel meter should now be illuminated indicating that the receiver is on.
6. Turn the transmitter on and note that the "XMTR On" light should now be illuminated, indicating proper reception of the transmitter's carrier.

7. A pair of headphones may be used to monitor the output signal from the receiver. These should be connected to the monitor output jack on the front panel of the receiver. The volume control for the monitor output is located directly above the output jack.

NOTE: More detailed information on the 221 Transmitter and 121 Receiver is available in the following pages.

## Transmitter

**ANTENNA**-The transmitter antenna is a flexible length of wire attached to a Lemo F00.250 s/3.2 connector. The length of the antenna is dependent upon the operating frequency of the transmitter.

**ON/OFF SWITCH**-The on/off switch turns the entire transmitter off and on. When the switch is in the "on" position, a small white "0" will be visible on the switch.

**MICROPHONE CONNECTORS**-The transmitter has two microphone input connectors wired in parallel with one another, a Lemo Quick-Lok #RA 0.302 and a Switchcraft TR-2A. A mating Lemo Quick-Lok Connector #F 0.302 s/4.2 is supplied with each transmitter. The Lemo connector provides a superior strain and flex relief and is mechanically and electrically more reliable than the TR-2A connector. The TR-2A connector is provided to allow compatibility in the field with existing connectors.

**MICROPHONE INPUT**-The microphone input is switchable, via a jumper on the transmitter printed circuit board between a standard low impedance dynamic microphone input and an electret HiZ input complete with a negative bias voltage. With the bias voltage required for the condenser mike supplied by the transmitter, the bulky battery/transmitter housing normally required with the condenser mike may be eliminated. The input sensitivity is adjustable between -65 dBm and -40 dBm.

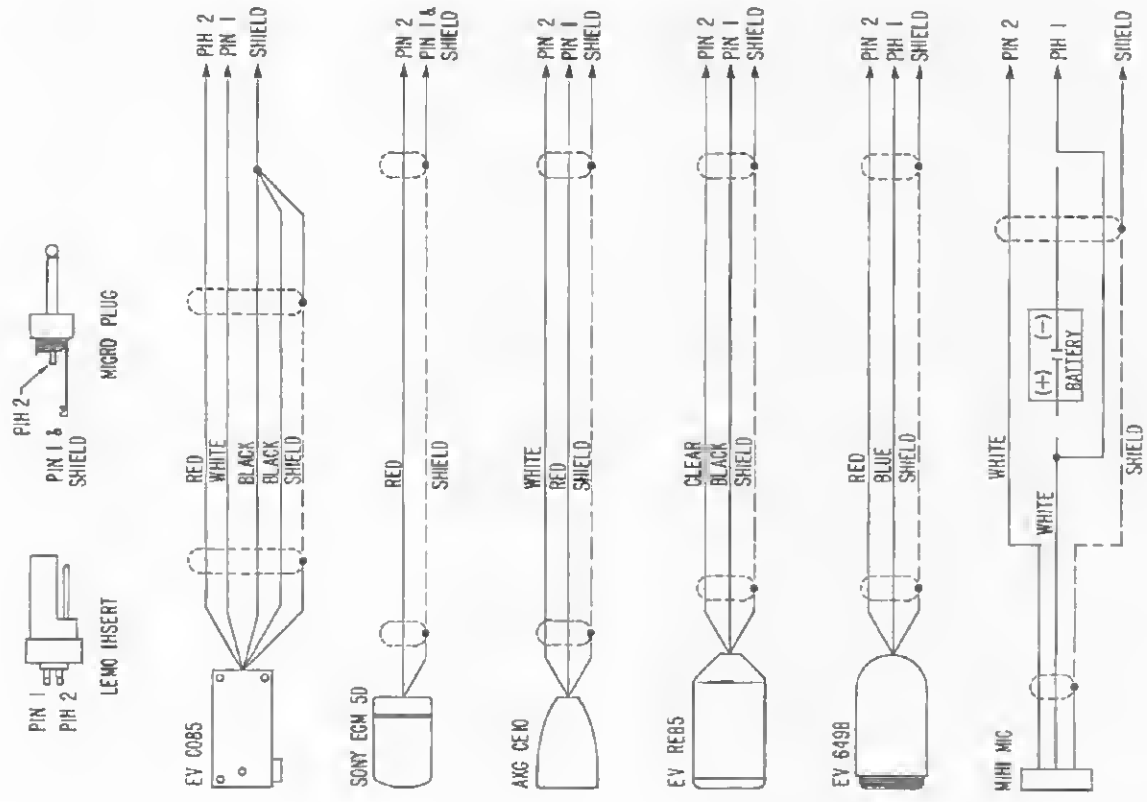
**DYNAMIC MICROPHONE INPUT**-The microphone input jumper is set for a dynamic microphone input when it leaves the factory. The position of the jumper on the printed circuit board may be verified by removing the metal shield from over the printed circuit board. The jumper is located directly behind the microphone input Lemo connector and is "U" shaped, covered with a clear insulating tubing. There are three contacts on the P.C. board and the labeling bias "in" and "out" appears beside them. As you face the transmitter with the microphone input connector to your left, the jumper should be between the center contact and the contact on the left labeled "out." This is the correct position for the jumper in the dynamic microphone input mode.

**ELECTRET SELF POWERING MIKE INPUT**-To change the microphone input to accept and provide bias for a miniature electret condenser microphone such as an Electro-Voice CO85, Sony ECM50, AKG CE-10, etc., the jumper on the P.C. board must be moved. (Refer to the above section on dynamic microphone input for the location of the jumper on the board.) The jumper should be between the center contact and the contact to its immediate right labeled "In." This turns on the bias voltage required by the electronics in the electret. **NOTE:** This mode of operation allows the use of certain electret microphones without the need of the bulky battery/transformer housing normally required with these units. If you wish to use this type of microphone with its battery/transformer housing, then the transmitter microphone input should be configured for use with a dynamic microphone.

Wiring diagrams for connecting different microphones to the transmitter can be found on Page 5.

**AUDIO LEVEL ADJUST**-The microphone input sensitivity is adjustable between -65 dBm to -40 dBm. This adjustment is made with the case of the transmitter open. A small screwdriver is used to adjust the volume control located on the transmitter printed circuit board. The volume control is accessible through a hole in the metal shield labeled "GAIN." Any adjustment to the microphone input sensitivity should be done while monitoring the modulation indicator (see below).

WIRING DIAGRAM FOR MICROPHONES TO BE CONNECTED TO THE 221 TRANSMITTER USING THE LEMO F 0-302 S/4-2 OR A MICRO PLUG.



**MODULATION INDICATOR**-The modulation indicator is a light emitting diode. This LED can be viewed through the hole in the metal shield of the transmitter labeled "Peak Mod Indicator." The LED begins to illuminate just as the transmitter compressor begins to operate. To optimize the signal-to-noise ratio and dynamic range of the transmitter/receiver system, the input sensitivity should be adjusted so that the LED only flashes briefly during the loudest passages in the dialogue. This adjustment should be made with the microphone placed on the talent as it will be used during the dialogue.

**COMPRESSOR**-The compressor in the 221 Transmitter provides for over 40 dB of compression above 100% modulation. The compressor has an extremely fast attack time. The compressor activates only when a signal level exceeds 0 VU. When a signal level exceeds 0 VU, the compressor allows a slight rise in output instead of limiting the signal to a given level; this prevents the harsh sound commonly associated with hard limiting.

**BATTERY**-The current consumption of the 221 Transmitter (30 ma nominal) is such that the use of heavy duty (Alkaline) batteries is recommended. The transmitter operates on a standard 9-volt transistor radio battery, for the battery type see the battery chart below. The nominal battery life of the transmitter in the low power mode is eight hours. It is strongly recommended that a new battery be used at the beginning of each day of shooting (film use) or before every performance (stage, television). With the transmitter in the high power mode, the nominal battery life is five hours. **CAUTION:** Some stores may have batteries in stock that have been on the shelf for an extended period of time. This will shorten the useful life of the battery. Purchase only fresh batteries from a store that has a good turnover in its battery stock.

Mallory	Eveready	NEDA	Burgess
MN1604	216	1604	2NG

**HIGH/LOW POWER MODE**-When the 221 Transmitter leaves the factory, the power output of the transmitter is 50 mw. The power level of the transmitter can be doubled to 100 mw by moving a jumper on the printed circuit board. This jumper is stored in the middle of the transmitter printed circuit board directly behind the case latch. To switch to the high power mode, remove the jumper from the center of the board and place it in the contacts in line with the antenna connector halfway back on the board.

## Receiver

**ANTENNA**-A female antenna connector (#S0-239) is provided on the rear panel of the receiver. This connector permits the use of either the supplied whip antenna or a remote antenna system. The antenna input impedance is 50 ohms. When using the supplied whip antenna, it is preferable to use it in its vertical position, oriented so that it is perpendicular to the floor. The transmitter antenna should also be used in a vertical position.

**AC IN**-This connector accepts the supplied AC power cable. The power cable should be connected to the receiver and to an AC outlet which will provide 105-125 VAC 50-60 Hz.

**AC CKT BKR**-The resettable AC circuit breaker is connected in series with the primary winding of the receiver's transformer. The use of a resettable AC circuit breaker frees the operator from having to maintain an inventory of spare fuses. If for any reason the circuit breaker should disrupt power to the receiver, it can be reset by pushing the red shaft of the circuit breaker in until you hear it click into position. If after resetting the circuit breaker it should pop out again, then the cause of the circuit breaker popping should be determined and repaired.

**SQUELCH ADJUST**-The squelch level of the receiver is set at the factory to .8 uv. The squelch level may be adjusted in the field for the best compromise between background noise level before receiver muting (squelch) versus maximum working distance. With the squelch control set fully counterclockwise, the receiver muting will be inoperative even when the transmitter's signal level becomes weak and the transmitter/receiver system signal-to-noise ratio becomes excessive. This setting of the squelch control would be used only when the primary purpose of the transmitter/receiver system is for information retrieval. For live entertainment a higher squelch level would be desired. With the receiver set to a higher squelch level, the audio signal fed to the sound reinforcement system during a performance will be muted or turned off automatically at the receiver, should the transmitter signal become too weak to maintain a good signal-to-noise ratio. This will prevent the audience from hearing the loud rushing noise of an unmuted FM radio receiver.

**AUDIO OUT**-The male three pin XLR type connector (D3M) provides a balanced line or microphone level output. The output level is controlled by the "line-mike" switch (see below). The audio signal appears on Pins 2 and 3 of the D3M connector (Pin 1 is ground) and Pins J and K of the accessory connector (Pin H is ground). The output impedance of the receiver's amplifier is 150 ohms line level (designed to work into 600 ohms), and 10 ohms mike level (designed to work into 50 ohms or greater). The audio output level is: Line - 0 dBm @ 0 VU, Mic - -52 dBm @ 0 VU, with 10 dB of headroom.

**LINE-MIC**-This switch controls the audio output level available at the audio connector and accessory connector and is recessed to prevent accidental changes in output level.

**ACCESSORY**-The chassis accessory connector (Amphenol #1-126-013) and its mating plug (Amphenol #1-126-220) allow easy access to certain portions of the receiver's circuitry. The receiver will accept an external voltage of +10 to +30 volts on Pin E with Pin H as ground. This audio output appears on Pins J and K. A regulated 7.5

volts at 100 ma is available on Pin B. Pin A provides a signal output for a diversity switcher. The accessory socket allows the receiver to derive its power from an external source and feed an audio signal to the equipment supplying that power. By having all signals and voltages appear at the accessory connector, one common cable can be used between the receiver and related equipment.

**PWR/MTR SWITCH**-This switch turns the power on and off to the receiver and selects which of the three functions, VU, RF, or battery condition the panel meter will monitor.

**PANEL METER**-When the receiver is powered from an AC outlet, the panel meter will be illuminated. The panel meter lights will not operate when the receiver is powered from an external DC power source or from internal batteries. This reduces the receiver's current consumption, thereby extending battery life. With the PWR/MTR Switch in the VU position, the meter will monitor the audio output level, 0 VU is equal to 0 dBm. In the RF signal strength mode, the meter will display relative signal strength at the receiver antenna. In this mode 0 VU is equal to a signal level of 30 microvolts. The internal battery voltage can be monitored by the panel meter and a reading of 0 VU is equal to a battery voltage of 8.5 volts. The internal batteries should not be used when the meter reading drops below 0 VU.

**TRICKLE CHARGER**-The internal trickle charger will bring a set of internal nickel cadmium batteries (optional) to a full charge in sixteen hours. The receiver must be turned on for the charger to operate. The trickle charger will be in operation any time the receiver is powered from AC and is turned on.

**POWER LOGIC SELECTOR**-The receiver is capable of being powered from three different power sources. The power logic selector automatically and silently selects which of the three power sources to use with the following priority: AC, external DC, internal battery.

**FCC REGULATIONS-**The Electro-Voice Model 221 Transmitter is type accepted under United States Federal Communications Commission Part 91.555. Because licensing of Electro-Voice equipment is the user's responsibility and licensability depends upon the user's classification, user's application, frequency selected and jurisdiction of telecommunications authority, Electro-Voice assumes no responsibility for frequency selection and ultimate licensing of the equipment. Electro-Voice strongly urges that the user contact the appropriate telecommunications authority before ordering and choosing of frequencies. Frequencies must be specified when ordering.

**WARRANTY-Electro-Voice Radio Frequency Equipment** Products are guaranteed for one year from date of original purchase against malfunction due to defects in workmanship and materials. If such malfunction occurs, the unit will be repaired or replaced (at our option) without charge for materials or labor if delivered prepaid to the proper Electro-Voice service facility. Unit will be returned prepaid. Warranty does not cover finish or appearance items or malfunction due to abuse or operation at other than specified conditions. Repair by other than Electro-Voice or its authorized service agencies will void this guarantee.

For shipping address and instructions on return of Electro-Voice products for repair and locations of authorized service agencies, please write: Professional Products Department, Electro-Voice, Inc., 600 Cecil Street, Buchanan, Michigan, 49107 (Phone: 616/695-6831).

Electro-Voice also maintains complete facilities for non-warranty service.

## SPECIFICATIONS

### OVERALL SYSTEM

Frequency Response  
±2 dB, 40 Hz-12 kHz

S/N Ratio  
Better than 60 dB

Distortion  
Less than 1% THD

R.F. Carrier Frequency  
150-210 MHz

Frequency Stability  
0.005% (crystal controlled)

Modulation  
± 10 kHz deviation FM

Operating Temperature  
0 to + 40 degree C  
(32 - 104 degree F)

Operating Range  
100 ft. under typical  
adverse conditions  
2000 ft. line of sight

### TRANSMITTER

R.F. Power Output (into 50 ohms)  
Switchable, Low Pwr. Mode - 50 mw  
High Pwr. Mode - 100 mw

R.F. Output Impedance  
50 ohms

Radiated Harmonic & Spurious Emissions  
Less than -40 dB

Modulation Limiter  
Compressor activates  
@ 100% modulation,  
40 dB range

Modulation Indicator  
LED activates @ 100% modulation

Audio Input  
Switchable, low Z dynamic  
microphone -40 to -65 dBm or  
Electret compatible with  
switchable DC BIAS for Electret  
microphone

Antenna  
45.7 cm (18 in) Flexible Wire

Connectors  
Antenna  
Coaxial Lemo Quick-Lok  
Microphone  
Lemo 2 pin Quick-Lok in parallel  
with a Micro-jack (TR2A)

Controls  
On/Off switch, Internal Mike  
level adjust

Battery  
Mallory MN1604 or equivalent

Battery Life  
B hrs. nominal (low pwr. mode)

### TRANSMITTER - Continued

Dimensions  
L x W x H 10.2 x 6.4 x 2 cm  
(4 x 2.5 x .8 inches)

Weight  
14.2 grams (5 oz) - w/o battery

### RECEIVER

R.F. Sensitivity  
1. uV for 30 dB quieting

Capture Ratio  
1.5 dB

Image Rejection  
Better than -65 dB

Antenna Input Impedance  
50 ohms

Squelch Threshold  
Set @ 0.8 uV (adjustable)

IF Selectivity  
Ceramic Filter

Audio Outputs  
Line Level Balanced,  
Output impedance, 600 ohms.  
Output level @ 0 VU =  
0 dBm w/10 dB of headroom

Mike Level Balanced,  
Output impedance, 200 ohms.  
Output level -52 dBm w/10 db  
of headroom

Monitor output unbalanced,  
Output impedance, 8 ohms.  
Maximum output level .3 watts

Power Requirements  
115 VAC/50-60 Hz, External  
10-30 VDC or optional internal  
rechargeable Ni-Cad Batteries

Accessory Connector Input/Outputs  
Diversity sense-out, Ext 10-30VDC  
in, Regulated 7.5 VDC out,  
Balanced Audio out

Dimensions  
L x W x H  
17.8 x 14.6 x 7.6 cm  
(7.0 x 5.75 x 3 in)

Weight  
1.13 kg (2 lbs 8 oz) w/o batteries

Accessories Furnished  
79993 Transmitter Antenna  
17249 Transmitter Audio Connector  
79994 Receiver Antenna  
1725B Receiver Accessory Connector  
16601 Receiver Power Cord

Optional Accessories  
20229 Internal Battery Holder  
20230 Set of Rechargeable Batteries